



**Working Draft**

Version 2 - May 2007



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## ***The NASA Vision***

To improve life here,  
To extend life to there,  
To find life beyond.

## ***The NASA Mission***

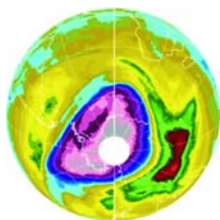
To understand and protect our home planet,  
To explore the universe and search for life,  
To inspire the next generation of explorers...  
as only NASA Can

***[www.nasa.gov](http://www.nasa.gov)***

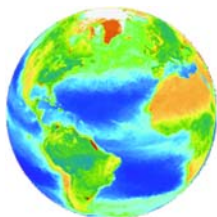
# ***Science Mission Directorate Earth-Sun System Division***

## ***Focus Areas***

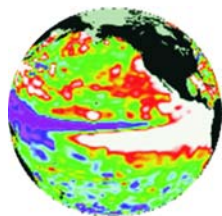
The NASA Earth-Sun Division seeks to develop a scientific understanding of the Earth-Sun system and its response to natural and human-induced changes to enable improved prediction of climate, weather, and natural hazards for present and future generations.



**Atmospheric  
Composition**



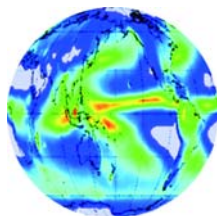
**Carbon Cycle  
& Ecosystems**



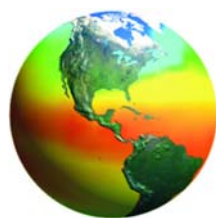
**Climate Variability  
& Change**



**Earth Surface  
& Interior**



**Water & Energy  
Cycle**



**Weather**



**Sun Solar System**

# Research Strategy

NASA's Earth-Sun System Division is developing a scientific understanding of the Earth-Sun system and its response to natural and human-induced changes to enable improved prediction capability for climate, weather, and natural hazards. The Earth-Sun System Division has an end-to-end strategy to ensure that all the information, understanding, and capabilities derived from its research program achieve maximum usefulness for the scientific and decision-making communities. Increasing our knowledge of the Earth system is the goal of the Earth-Sun System Division's Research Program, which is complemented by the Earth-Sun System Division's Applied Sciences Program and Technology Program.

The Earth-Sun System Division has defined its research strategy around a hierarchy of scientific questions. At the highest level, the Earth-Sun System Division is attempting to provide an answer to one overarching question:

**How is the Earth changing and what are the consequences for life on Earth?**

The magnitude and scope of this question are too large to allow a simple answer, requiring a lower tier of questions that provide the conceptual approach that the Earth-Sun System Division is taking to improve our knowledge of the Earth system:

**Variability:** How is the global system changing?

**Forcing:** What are the primary forcings of the Earth system?

**Response:** How does the Earth system respond to natural and human-induced changes?

**Consequence:** What are the consequences of change in the Earth system for human civilization?

**Prediction:** How will the Earth system change in the future, and how can we improve predictions through advances in remote sensing observations, data assimilation and modeling?

## Specific Science Questions

Variability	Forcing	Response	Consequence	Prediction
Precipitation, evaporation & cycling of water changing?	Atmospheric constituents & solar radiation on climate?	Clouds & surface hydrological processes on climate?	Weather variation related to climate variation?	Weather forecasting improvement?
Global ocean circulation varying ?	Changes in land cover & land use?	Ecosystems, land cover and biogeochemical cycles?	Consequences of land cover & land use change?	Improve prediction of climate variability and change?
Global ecosystems changing?	Motions of the Earth and the Earth's interior transformation?	Changes in global ocean circulation?	Coastal region impacts?	Ozone, climate and air quality impacts of atmospheric composition?
Atmospheric composition changing?		Atmospheric trace constituent responses?	Regional air quality impacts?	Carbon cycle and ecosystem change?
Ice cover mass changing?		Sea level affected by Earth system changes?		Change in water cycle dynamics?
Earth surface transformation?				Predict and mitigate natural hazards from Earth surface change?

# Applications of National Priority



Agricultural Efficiency



Air Quality



Aviation



Carbon Management



Coastal Management



Ecological Forecasting



Disaster Management



Energy Management



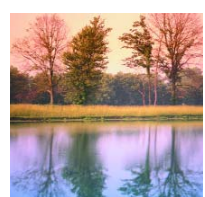
Homeland Security



Invasive Species

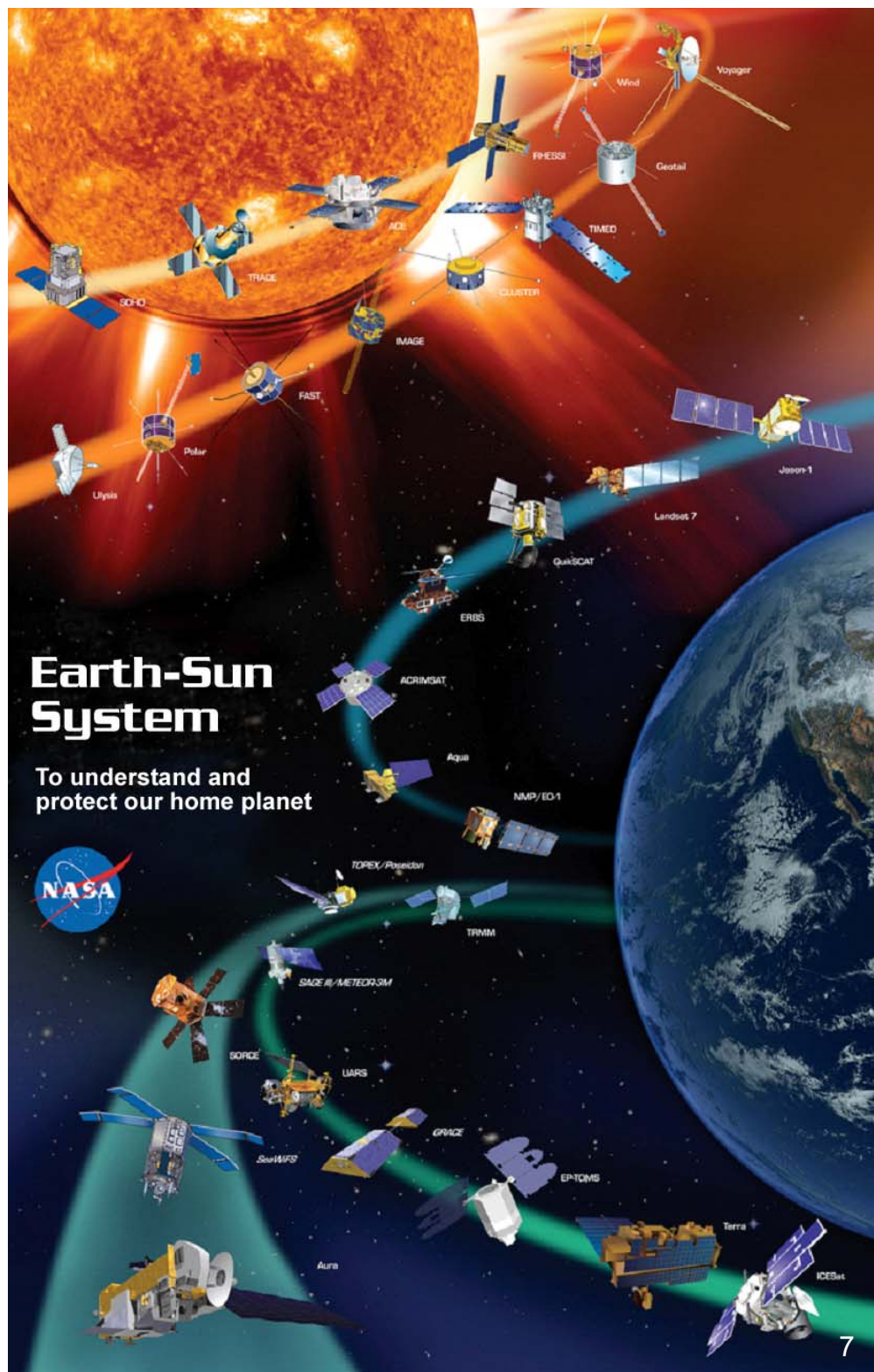


Public Health



Water Management

The NASA Applied Sciences Program mission is to expand and accelerate the realization of economic and societal benefits from Earth science, information, and technology. The overarching goal is to bridge the gap between Earth system science research results and the adoption of observations and prediction capabilities for reliable and sustained use in decision support.

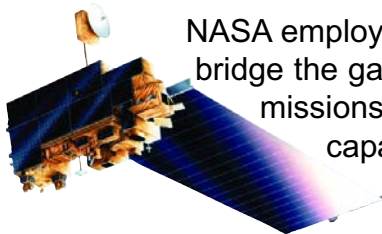


# Earth-Sun System

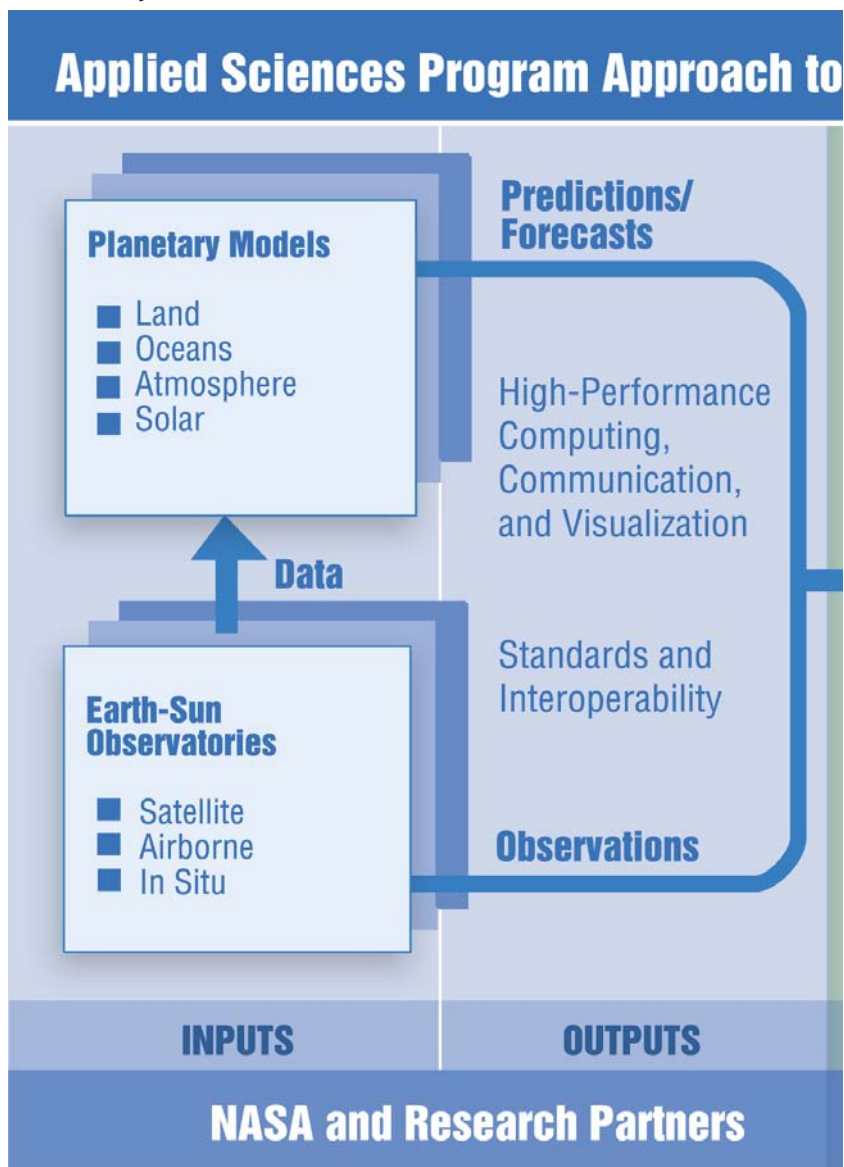
To understand and protect our home planet



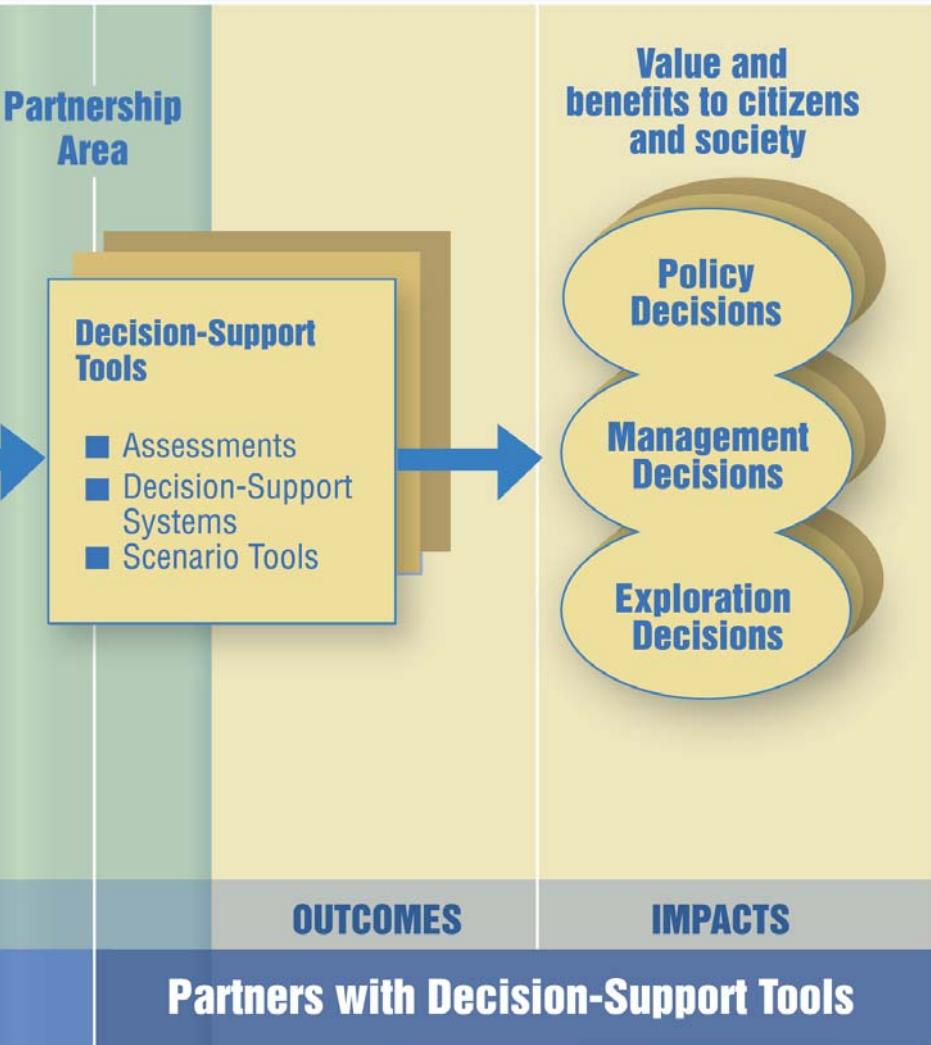
# Integrated System Solutions Architecture



NASA employs a systems engineering approach to bridge the gap between Earth-Sun system science missions and models. The data and prediction capabilities are adopted for reliable and sustained use in decision support.



# Integrated System Solutions



# **Applied Sciences Program**

## **Management Decision Support Tools**

# PECAD/CADRE

## Production Estimates and Crop Assessment Division/Crop Assessment Data Retrieval and Evaluation

**Purpose/General Description of Decision Support Tool:** Monitor global agricultural commodities, focus on global agricultural production and conditions that affect food security.

**Value and Benefits:** Early warning of problems in major agricultural commodities; Better seasonal yield estimates; Early warning of food shortages; Greater economic security for agriculture sector.

### Predictions:

- 12-month Global seasonal surface temperature/soil moisture/precipitation forecast
- Crop maturity
- Crop yield
- Water availability

### Observations:

- Biomass
- Land cover/ use
- Land surface topography
- Ocean surface currents
- Global precipitation
- Soil moisture
- Reservoir level
- Evapotranspiration
- Radiation



# DRAFT

### Outcomes:

- Generated time-series graphs for rainfall, temperature, and soil moisture
- Multiyear time series/crop comparisons
- Vegetation anomaly detection
- Automated Web products

DST Point of Contact (POC): Brad Doorn

POC e-mail: [pecad@fas.usda.gov](mailto:pecad@fas.usda.gov)

POC Phone: (202) 690-0131

Decision Support Tool User/Operator Organization: USDA Foreign Agriculture Service

Decision Support Tool Owner/Developer:

Operational Status: In use since early 1980s

DST Type:

Validation:

Configuration Control:

Notes:

Agricultural Efficiency

NASA HQ POC: Ed Sheffner

NASA HQ POC Phone: (202) 358-0239

NASA HQ POC e-mail: [esheffne@mail.hq.nasa.gov](mailto:esheffne@mail.hq.nasa.gov)



# CMAQ

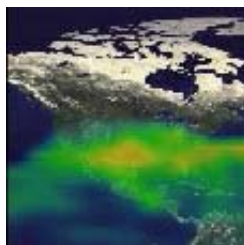
## Community Multiscale Air Quality Modeling System

**Purpose/General Description of Decision Support Tool:** Deliver NASA Earth Science data Product to EPA/Air Quality Decision Support Systems. Deliver data from NASA space-borne assets to AIR NOW decision systems for regional particle matter forecasting.

**Value and Benefits:** Reduce lung-related diseases and premature death; Reduce hospital admissions and use of medicines; Reduce lost workdays and schooldays; Improve visibility and reduce haze for tourism; Improve resiliency of crops; increase yields; Increase confidence in Government; Improve crop estimates; Sensitive populations can change activities

### Predictions and Observations:

- Atmospheric state parameters
- Global-to-regional concentrations
- Emissions inventories
- Regional-global transport
- Trace gas sources
- Aerosol properties
- Ozone profiles and columns
- Global-regional boundary conditions
- Data fusion techniques
- Ground-satellite data comparison techniques



### Outcomes:

- Assess emissions-control strategies
- Develop achievable SIPs (State Implementation Plan)
- Assess compliance
- Waivers to air standards
- Quantify voluntary stationary emission reductions

# DRAFT

DST Point of Contact (POC): Kenneth L. Schere

POC e-mail: [schere.kenneth@epa.gov](mailto:schere.kenneth@epa.gov)

POC Phone: (919) 541-3795

Decision Support Tool User/Operator Organization: Environmental Protection Agency

Decision Support Tool Owner/Developer:

Operational Status: 1991

DST Type: Software, downloadable software to be installed locally

Validation:

Configuration Control:

Notes:

Air Quality

NASA HQ POC: Lawrence Friedl

NASA HQ POC Phone: (202) 358-1599

NASA HQ POC e-mail: [lfriedl@mail.hq.nasa.gov](mailto:lfriedl@mail.hq.nasa.gov)



# AIRNow AQI Forecasting

## Air Quality Index Forecasting

**Purpose/General Description of Decision Support Tool:** Report concentrations of five main pollutants to the general public.

**Value and Benefits:** Reduce lung-related diseases and premature death; Reduce hospital admissions and use of medicines; Reduce lost workdays and schooldays; Improve visibility and reduce haze for Tourism; Improve resiliency of crops, increase yields; Increase confidence in Government; Improve crop estimates; Sensitive populations can change activities.

### Predictions and Observations:

- Atmospheric state parameters
- Global-to-regional concentrations
- Emissions inventories
- Regional-global transport
- Trace gas sources
- Aerosol properties
- Ozone profiles and columns
- Global-regional boundary conditions
- Data fusion techniques
- Ground-satellite data comparison techniques



### Outcomes:

- Forecast transport of dust/pollutants
- Actions to reduce source emissions
- PM2.5 forecasts

# DRAFT

DST Point of Contact (POC): Doreen Neil

POC e-mail: Doreen.O.Neil@nasa.gov

POC Phone: (757) 864-8171

Decision Support Tool User/Operator Organization: Environmental Protection Agency

Decision Support Tool Owner/Developer:

Operational Status: Estimated October 2003

DST Type:

Validation:

Configuration Control:

Notes:

NASA HQ POC: Lawrence Friedl

NASA HQ POC Phone: (202) 358-1599

NASA HQ POC e-mail: lfriedl@mail.hq.nasa.gov

Air Quality



# NAS-AWRP

## National Air Space-Aviation Weather Research Program

**Purpose/General Description of Decision Support Tool:** Increase the scientific understanding of atmospheric conditions that cause dangerous weather, which in turn, impacts aviation.

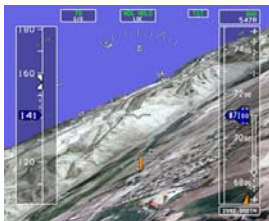
**Value and Benefits:** Improved safety; Improved airline efficiency; Earlier warnings of hazardous weather; Reduction in the cost of flying.

### Predictions:

- Convective weather
- Turbulence
- Icing
- Ceiling and visibility
- Volcanic transport
- Oceanic winds
- Winter storms
- Tropical cyclones

### Observations:

- Atmospheric temperature
- Atmospheric water vapor
- Atmospheric winds
- Storm cell properties
- Volcanic gas and ash
- Cloud properties
- Global precipitation



### Outcomes:

- Key weather observations
- Nowcasting products
- 24-hour precise continuous atmosphere
- Weather warnings and predictions
- Accurate and easily accessible weather forecasts
- Increase in understanding of atmospheric conditions
- Real-time interest fields
- Comprehensive image library

DRAFT

DST Point of Contact (POC): Gloria Kulesa

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POC Phone:

Decision Support Tool User/Operator Organization: Federal Aviation Administration

Decision Support Tool Owner/Developer:

Operational Status: Phase 2 (2003-2007)

DST Type:

Validation:

Configuration Control:

Notes:

NASA HQ POC: John Haynes

NASA HQ POC Phone: (202) 358-4665

NASA HQ POC e-mail: jhaynes@mail.hq.nasa.gov

Aviation



# CQUEST

## Carbon Query and Evaluation Support Tools

**Purpose/General Description of Decision Support Tool:** Provide access to geographic data for carbon sequestration predictions throughout the United States.

**Value and Benefits:** Climate change mitigation; Improved efficiency in energy production; Improved efficiency in crop production through enhancements in soil carbon; Improved economy in marginal rural agricultural areas; Climate change mitigation.

### Predictions:

- Information products, predictions, and data from NASA ESE missions and models

### Observations:

- Land cover condition and change
- Volume of aboveground biomass forest condition
- Soil moisture
- Agricultural production and yield—CO<sub>2</sub> concentration in the atmosphere
- Oceanic carbon uptake and storage
- Fire management



### Outcomes:

- Soil carbon sequestration
- Forest management
- Crop planning and rotation
- Irrigation control
- Atmospheric pollution monitoring and prediction
- Energy production (burning of fossil fuels)
- Climate and weather
- Ocean carbon sequestration

DRAFT

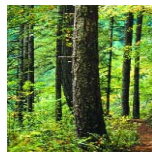
DST Point of Contact (POC): Chris Potter  
POC e-mail: Christopher.S.Potter@nasa.gov  
POC Phone: (650) 604-6164

Decision Support Tool User/Operator Organization: NASA Ames  
Ecosystem Science and Technology Branch  
Decision Support Tool Owner/Developer: NASA Ames Research Center

Operational Status:  
DST Type: Web-enabled application  
Validation:  
Configuration Control:  
Notes:

Carbon Management

NASA HQ POC: Ed Sheffner  
NASA HQ POC Phone: (202) 358-0239  
NASA HQ POC e-mail: esheffne@mail.hq.nasa.gov



# HABMapS

## Harmful Algal Bloom Bulletin/Mapping System

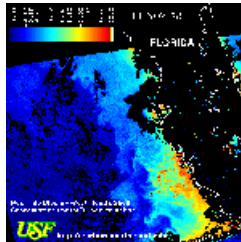
**Purpose/General Description of Decision Support Tool:** Provide information as a mapping tool to the management community in the Gulf of Mexico during a bloom event. Access recent data on harmful algal blooms in the Gulf of Mexico.

**Value and Benefits:** Reduce public health risks, hospital admissions, lost work-school days; Reduce impacts to regional coastal economies & tourism; Raise quotas for shellfish harvesting prior to HABs; improve siting and design of shellfish beds; Preserve ecological diversity and tourism economies; Reduce threats to human and natural environments; Rapid response to emergencies to reduce effects on human safety and economies; Public health and reduce preventable costs.

### Predictions and

#### Observations:

- Nearshore upwelling
- Speed and direction of ocean currents
- Ecological forecasts
- Runoff change
- Seasonal forecasts
- Aerosol properties
- Salinity predictions
- Ocean surface currents/ winds/ topography
- Sea Surface salinity/temperature
- Land use
- Phytoplankton concentrations



#### Outcomes:

- Analysis: Predict landfall, track transport/speed/direction, forecast duration/demise, assess severity
- Management: Warning time to fisheries managers, beach closures, shellfish quotas, finfish limits, aquaculture flushing and recirculation, mitigation response

# DRAFT

DST Point of Contact (POC): Mary Culver

POC e-mail: [Mary.Culver@noaa.gov](mailto:Mary.Culver@noaa.gov)

POC Phone: (843) 740-1250

Decision Support Tool User/Operator Organization: NOAA

CoastWatch and Coastal Services Center

Decision Support Tool Owner/Developer:

Operational Status: 2000

DST Type: Web-enabled application

Validation:

Configuration Control:

Notes:

Coastal Management

NASA HQ POC: Lawrence Friedl

NASA HQ POC Phone: (202) 358-1599

NASA HQ POC e-mail: [lfriedl@mail.hq.nasa.gov](mailto:lfriedl@mail.hq.nasa.gov)



# CREWS

## Coral Reef Early Warning System

**Purpose/General Description of Decision Support Tool:** Monitor and provide alerts on coral "bleaching" or whitening events that result in the degradation of coral reefs worldwide.

**Value and Benefits:** Reduce public health risks, hospital admissions, lost work-school days; Reduce impacts to regional coastal economies & tourism; Raise quotas for shellfish harvesting prior to HABs; improve siting and design of shellfish beds; Preserve ecological diversity and tourism economies; Reduce threats to human and natural environments; Rapid response to emergencies to reduce effects on human safety and economies; Public health and reduce preventable costs.

### Predictions and

#### Observations:

- Nearshore upwelling
- Speed and direction of ocean currents
- Ecological forecasts
- Runoff change
- Seasonal forecasts
- Aerosol properties
- Salinity predictions
- Ocean surface currents/ winds/ topography
- Sea Surface salinity/temperature
- Land use
- Phytoplankton concentrations



### Outcomes:

- Analysis: Assess potential bleaching conditions from wind, temperature, primary productivity
- Management: Warning time and automated alerts to managers, mitigation activities

# DRAFT

DST Point of Contact (POC): Jim Hendee

POC e-mail: [jim.hendee@noaa.gov](mailto:jim.hendee@noaa.gov)

POC Phone:

Decision Support Tool User/Operator Organization: NOAA/Atlantic Oceanographic and Meteorological Laboratory

Decision Support Tool Owner/Developer:

Operational Status: Current

DST Type: Web-enabled application

Validation:

Configuration Control:

Notes:

Coastal Management

NASA HQ POC: Lawrence Friedl

NASA HQ POC Phone: (202) 358-1599

NASA HQ POC e-mail: [lfriedl@mail.hq.nasa.gov](mailto:lfriedl@mail.hq.nasa.gov)



# GNOME

## General NOAA Oil Modeling Environment

**Purpose/General Description of Decision Support Tool:** Manage oil spill modeling, risk assessment, mitigation, and response by predicting how wind, current, river flow and tidal processes spread oil spills over water.

**Value and Benefits:** Reduce public health risks, hospital admissions, lost work-school days; Reduce impacts to regional coastal economies & tourism; Raise quotas for shellfish harvesting prior to HABs; improve siting and design of shellfish beds; Preserve ecological diversity and tourism economies; Reduce threats to human and natural environments; Rapid response to emergencies to reduce effects on human safety and economies; Public health and reduce preventable costs

### Predictions and

#### Observations:

- Nearshore upwelling
- Speed and direction of ocean currents
- Ecological forecasts
- Runoff change
- Seasonal forecasts
- Aerosol properties
- Salinity predictions
- Ocean surface currents/ winds/ topography
- Sea Surface salinity/temperature
- Land use
- Phytoplankton concentrations



### Outcomes:

- Oil spill modeling

# DRAFT

DST Point of Contact (POC): NOAA Hazmat

POC e-mail: [ORR.GNOME@noaa.gov](mailto:ORR.GNOME@noaa.gov)

POC Phone: (206) 526-6317

Decision Support Tool User/Operator Organization: NOAA Hazardous Materials Response Division

Decision Support Tool Owner/Developer:

Operational Status: Current

DST Type: Web-enabled application

Validation:

Configuration Control:

Notes:

Coastal Management

NASA HQ POC: Lawrence Friedl

NASA HQ POC Phone: (202) 358-1599

NASA HQ POC e-mail: [lfriedl@mail.hq.nasa.gov](mailto:lfriedl@mail.hq.nasa.gov)



# HAZUS

## Hazards United States

**Purpose/General Description of Decision Support Tool:** Assess the effects and potential losses due to earthquakes, floods, and wind hazards using GIS software.

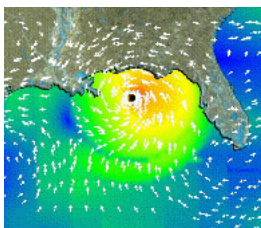
**Value and Benefits:** Identify/prioritize high-risk Communities; Reduce in lives and property lost; Reduce in damage cost and time to recovery; Anticipate the scope of disaster-related damage; Improve disaster response; Community planning; Land Resource preservation.

**Predictions:**

- Atmospheric temperature water vapor, winds
- Severe weather (lightning)
- Volcanic ash
- Aerosols, smoke
- Cloud properties
- Global precipitation
- Land/terrain/use/veg
- Aquifers
- Wetlands

**Observations:**

- Hazard maps
- Earthquake vulnerability and prediction
- Flooding and coastal inundation
- Hurricane/ typhoon track and intensity
- Precipitation amount
- Wind Velocity/direction
- Surface deformation



**Outcomes:**

- Disaster mitigation/ preparedness
- Built environment risk and loss
- Socio-economic impacts

**DRAFT**

DST Point of Contact (POC): Claire Drury

POC e-mail: [hazus@fema.gov](mailto:hazus@fema.gov)

POC Phone: (202) 646-2884

Decision Support Tool User/Operator Organization: Federal Emergency Management Agency

Decision Support Tool Owner/Developer:

Operational Status: Available since 1997

DST Type: Software, downloadable software to be installed locally

Validation:

Configuration Control:

Notes:

Disaster Management

NASA HQ POC: Stephen Ambrose

NASA HQ POC Phone: (202) 358-0851

NASA HQ POC e-mail: [sambrose@mail.hq.nasa.gov](mailto:sambrose@mail.hq.nasa.gov)



# AWIPS

## Advanced Weather Interactive Processing System

**Purpose/General Description of Decision Support Tool:** Display overlayed layers of graphical meteorological data over a specific geographical area to assist in delivering local forecasts quickly.

**Value and Benefits:** Identify/prioritize high-risk Communities; Reduce in lives and property lost; Reduce in damage cost and time to recovery; Anticipate the scope of disaster-related damage; Improve disaster response; Community planning; Land Resource preservation.

### Predictions:

- Atmospheric temperature water vapor, winds
- Severe weather (lightning)
- Volcanic ash
- Aerosols, smoke
- Cloud properties
- Global precipitation
- Land/terrain/use/veg
- Aquifers
- Wetlands

### Observations:

- Hazard maps
- Earthquake vulnerability and prediction
- Flooding and coastal inundation
- Hurricane/ typhoon track and intensity
- Precipitation amount
- Wind Velocity/direction
- Surface deformation



### Outcomes:

- Weather prediction and observations
- Weather watches and warnings
- Data dissemination assimilation, models
- Public access to information

# DRAFT

DST Point of Contact (POC):

POC e-mail:

POC Phone:

Decision Support Tool User/Operator Organization: NOAA National Weather Service

Decision Support Tool Owner/Developer: Northrup Grumman Information Technology

Operational Status:

DST Type:

Validation:

Configuration Control:

Notes:

Disaster Management

NASA HQ POC: Stephen Ambrose

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NASA HQ POC e-mail: [sambrose@mail.hq.nasa.gov](mailto:sambrose@mail.hq.nasa.gov)



# SERVIR

## Regional System of Monitoring and Visualization

**Purpose/General Description of Decision Support Tool:** Monitor and forecast ecological changes, respond to natural disasters, and better understand both natural and human effects on climate in Mesoamerica.

**Value and Benefits:** Manage a global hotspot of biodiversity (i.e., Mesoamerica) at a regional scale through the coordination of the activities of seven countries—a model for other regions; Predict the impacts of changing land use patterns and climate on the ecosystem services that support all human enterprises; Develop ecological forecasts with reliable assessments of error.

### Predictions:

- Species distributions
- Ecosystem fluxes
- Ecosystem productivity
- Population ecology
- Land cover change

### Observations:

- Land cover/land use and disturbances (e.g., fire)
- Species composition
- Biomass/productivity
- Phenology
- Vegetation structure
- Elevation
- Surface temperature
- Soil moisture
- Precipitation
- Winds
- SST, SSH, circulation, and salinity
- Atmospheric temperature



### Outcomes:

- Monitor changes in land cover, weather, and fires to assist the sustainable management of the Mesoamerican Biological Corridor

# DRAFT

DST Point of Contact (POC): Dan Irwin

POC e-mail: [Daniel.E.Irwin@nasa.gov](mailto:Daniel.E.Irwin@nasa.gov)

POC Phone: (256) 961-7945

Decision Support Tool User/Operator Organization: National Space Science and Technology Center

Decision Support Tool Owner/Developer: NASA/World Bank/USAID/CCAD

Operational Status: 2002/2003

DST Type: Clearinghouse or compendium of thematically related pieces

Validation:

Configuration Control:

Notes:

Ecological Forecasting

NASA HQ POC: Woody Turner

NASA HQ POC Phone: (202) 358-1662

NASA HQ POC e-mail: [woody.turner@nasa.gov](mailto:woody.turner@nasa.gov)



# TOPS

## Terrestrial Observation and Prediction System

**Purpose/General Description of Decision Support Tool:** Enhance management decisions related to floods, droughts, forest fires, human health, and crop, range, and forest production.

**Value and Benefits:** Manage a global hotspot of biodiversity (i.e., Mesoamerica) at a regional scale through the coordination of the activities of seven countries—a model for other regions; Predict the impacts of changing land use patterns and climate on the ecosystem services that support all human enterprises; Develop ecological forecasts with reliable assessments of error.

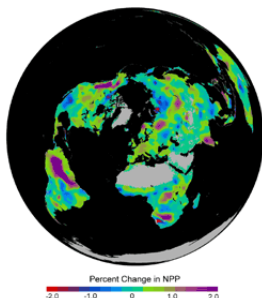
### Predictions:

- Species distributions
- Ecosystem fluxes
- Ecosystem productivity
- Population ecology
- Land cover change

### Observations:

- Land cover/land use and disturbances
- Surface and atmospheric temperatures
- Soil moisture and precipitation
- Winds
- Species composition
- Biomass/productivity
- Phenology
- Vegetation structure
- Elevation
- SST, SSH, circulation, and salinity

### Outcomes:



# DRAFT

DST Point of Contact (POC): Ramakrishna Nemani

POC e-mail: [nemani@ntsg.umd.edu](mailto:nemani@ntsg.umd.edu)

POC Phone: (406) 243-4693

Decision Support Tool User/Operator Organization: University of Montana Numerical Terradynamic Simulation Group

Decision Support Tool Owner/Developer: University of Montana Numerical Terradynamic Simulation Group

Operational Status: 1982

DST Type: Software, downloadable software to be installed locally (currently unavailable)

Validation:

Configuration Control:

Ecological Forecasting

Notes:

NASA HQ POC: Woody Turner

NASA HQ POC Phone: (202) 358-1662

NASA HQ POC e-mail: [woody.turner@nasa.gov](mailto:woody.turner@nasa.gov)



# HOMER

## Micropower Optimization Model

**Purpose/General Description of Decision Support Tool:** Find the most cost effective methods of energy distribution by performing energy balance calculations for each hour of the year.

**Value and Benefits:** Optimize renewable energy systems for power production; Integrate traditional and renewable energy supply systems into electric power grid; Improve prediction of electric power need and supply—mitigate power shortages, prevent price increase; Reduce greenhouse emissions from energy production

### Predictions:

- 20+ years
- Past 90 days
- 1–15-day forecasts
- 12–18-month seasonal forecasts
- 10–20-year forecasts

### Observations

- Temperature and humidity profiles
- Cloud systems
- Land cover albedo
- Land surface temperature
- Soil moisture
- Ocean surface winds
- Global Precipitation
- Total aerosol amount
- Land surface topography
- Trace gas profiles



### Outcomes:

# DRAFT

DST Point of Contact (POC): Peter Lilianthal

POC e-mail: [peter\\_lilianthal@nrel.gov](mailto:peter_lilianthal@nrel.gov)

POC Phone: (303) 384-7444

Decision Support Tool User/Operator Organization: Midwest

Research Institute/DOE Office of Energy Efficiency

Decision Support Tool Owner/Developer: National Renewable Energy Laboratory

Operational Status: Version 2.10 (November 4, 2004)

DST Type:

Validation:

Configuration Control:

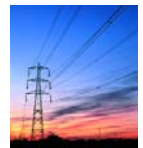
Notes:

Energy Management

NASA HQ POC: Greg Stover

NASA HQ POC Phone: (757) 864-7097

NASA HQ POC e-mail: [Greg.Stover@nasa.gov](mailto:Greg.Stover@nasa.gov)



# RETScreen

## Renewable Energy Technologies Screen

**Purpose/General Description of Decision Support Tool:** Provide global radiation budget datasets. Provide accurate global solar radiation and meteorology data.

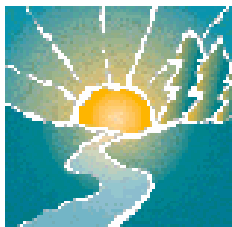
**Value and Benefits:** Optimize renewable energy systems for power production; Integrate traditional and renewable energy supply systems into electric power grid; Improve prediction of electric power need and supply—mitigate power shortages, prevent price increase; Reduce greenhouse emissions from energy production

### Predictions:

- 20+ years
- Past 90 days
- 1–15-day forecasts
- 12–18-month seasonal forecasts
- 10–20-year forecasts

### Observations

- Temperature and humidity profiles
- Cloud systems
- Land cover albedo
- Land surface temperature
- Soil moisture
- Ocean surface winds
- Global Precipitation
- Total aerosol amount
- Land surface topography
- Trace gas profiles



### Outcomes:

- Provides common platform for evaluating project proposals while significantly reducing the costs and uncertainties of preliminary studies
- Reduces the time and errors of a preliminary study

# DRAFT

DST Point of Contact (POC): Gregory J. Lend

POC e-mail: [rets@nrcan.gc.ca](mailto:rets@nrcan.gc.ca)

POC Phone: (450) 652-4621

Decision Support Tool User/Operator Organization: Natural Resources Canada

Decision Support Tool Owner/Developer:

Operational Status: 1998

DST Type: Excel spreadsheet

Validation:

Configuration Control:

Notes:

Energy Management

NASA HQ POC: Greg Stover

NASA HQ POC Phone: (757) 864-7097

NASA HQ POC e-mail: [Greg.Stover@nasa.gov](mailto:Greg.Stover@nasa.gov)



# IMAAC

## Interagency Modeling and Atmospheric Assessment Center

**Purpose/General Description of Decision Support Tool:** Coordinate federal support by DHS and provide effective communication between local, state, and federal emergency response agencies for assessing hazardous atmospheric releases during an incident of national significance.

**Value and Benefits:** Identify/prioritize high-risk communities; Reduction in lives lost; Reduce damage cost and time to recovery; Anticipate the scope of disaster-related damage; Improve disaster Response.

**Predictions:**

- Nuclear, chemical, biological, and radiological concentrations
- Precipitation distribution
- Wind velocity/direction
- Surface topography



**Outcomes:**

# DRAFT

DST Point of Contact (POC):

POC e-mail:

POC Phone:

Decision Support Tool User/Operator Organization:

Decision Support Tool Owner/Developer:

Operational Status:

DST Type:

Validation:

Configuration Control:

Notes:

NASA HQ POC: Stephen Ambrose

NASA HQ POC Phone: (202) 358-0851

NASA HQ POC e-mail: [sambrose@mail.hq.nasa.gov](mailto:sambrose@mail.hq.nasa.gov)

Homeland Security



URL Pending

# ISFS

## Invasive Species Forecasting System

**Purpose/General Description of Decision Support Tool:** Manage and control invasive species in all US Dept. of Interior and adjacent lands.

**Value and Benefits:** Reduce cost for invasive species control; Improve water quality; Reduce risk of disease to humans and livestock; Improve recreation; Improve freshwater fishing; Reduce costs for boating and waterway maintenance.

### Predictions:

- Information products, predictions, and data from NASA ESE missions and models

### Observations:

- Land cover and land cover change
- Climate and weather
- Location and condition of invasive species
- Soil moisture
- Water quality and recreation



### Outcomes:

- Invasive species forecasting system
- Livestock grazing control
- Water quality and availability
- Fishing management
- Recreation and tourism
- Public health

# DRAFT

DST Point of Contact (POC): John L. Schnase

POC e-mail: [schnase@gsfc.nasa.gov](mailto:schnase@gsfc.nasa.gov)

POC Phone: (301) 286-4351

Decision Support Tool User/Operator Organization: USGS, NASA  
Goddard Space Flight Center

Decision Support Tool Owner/Developer:

Operational Status: In use since early 1980s

DST Type: Web-enabled application

Validation:

Configuration Control:

Notes:

NASA HQ POC: Ed Sheffner

NASA HQ POC Phone: (202) 358-0239

NASA HQ POC e-mail: [esheffne@mail.hq.nasa.gov](mailto:esheffne@mail.hq.nasa.gov)

Invasive Species



# PSS

## Plague Surveillance System

### Purpose/General Description of Decision Support Tool:

**Value and Benefits:** Provide early warnings for harmful exposures, conditions favorable to vector proliferation; Reduce environmental related diseases; Improve prevention initiative targeting.

#### Predictions and Observations:

- Soil moisture
- Atmosphere temperature
- Ground temperature
- Humidity
- Precipitation
- Total column Ozone
- Total aerosol amount



#### Outcomes:

- Image output maps for PSS monitoring and scientific analysis
- Technologies for verification and validation of satellite data serve to PSS

# DRAFT

DST Point of Contact (POC):

POC e-mail:

POC Phone:

Decision Support Tool User/Operator Organization:

Decision Support Tool Owner/Developer:

Operational Status:

DST Type:

Validation:

Configuration Control:

Notes:

NASA HQ POC: John Haynes

NASA HQ POC Phone: (202) 358-4665

NASA HQ POC e-mail: [jhaynes@mail.hq.nasa.gov](mailto:jhaynes@mail.hq.nasa.gov)

Public Health



URL pending

# EPHTN

## Environmental Public Health Tracking Network

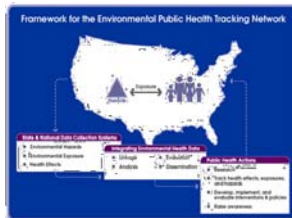
**Purpose/General Description of Decision Support Tool:** Integrate data about environmental hazards and exposures with data about diseases possibly linked to environment. Implement and evaluate regulatory and public health actions to prevent or control environment-related diseases.

**Value and Benefits:** Provide early warnings for harmful exposures, conditions favorable to vector proliferation; Reduce environmental related diseases; Improve prevention initiative targeting.

### Predictions and

#### Observations:

- Soil moisture
- Atmosphere temperature
- Ground temperature
- Humidity
- Precipitation
- Total column Ozone
- Total aerosol amount



#### Outcomes:

- Technologies for verification and validation of satellite data serve to EPHTN
- Data pipelines for direct feed of environmental measurement data to EPHTN-networked systems
- New or improved disease models
- Image output maps for EPHTN monitoring and scientific analysis

# DRAFT

DST Point of Contact (POC):

POC e-mail:

POC Phone:

Decision Support Tool User/Operator Organization: Center for Disease Control and Prevention/National Center for Environmental Health

Decision Support Tool Owner/Developer:

Operational Status: Estimated 2005-2007

DST Type:

Validation:

Configuration Control:

Notes:

NASA HQ POC: John Haynes

NASA HQ POC Phone: (202) 358-4665

NASA HQ POC e-mail: jhaynes@mail.hq.nasa.gov

Public Health



# MMS

## Malaria Modeling and Surveillance

**Purpose/General Description of Decision Support Tool:** Combat malaria and filariasis in the Greater Mekong Subregion using remote sensing and other technology.

**Value and Benefits:** Provide early warnings for harmful exposures, conditions favorable to vector proliferation; Reduce environmental related diseases; Improve prevention initiative targeting.

### Predictions and

#### Observations:

- Soil moisture
- Atmosphere temperature
- Ground temperature
- Humidity
- Precipitation
- Total column Ozone
- Total aerosol amount



### Outcomes:

- Vector habitat identification
- Identify key factors that sustain or intensify
- Transmission
- Risk prediction

# DRAFT

DST Point of Contact (POC): Richard Kiang

POC e-mail: (301) 614-5375

POC Phone: Richard.Kiang@nasa.gov

Decision Support Tool User/Operator Organization: Armed Forces Research Institute of Medical Sciences/Mahidol University, Bangkok, Thailand

Decision Support Tool Owner/Developer:

Operational Status: In development

DST Type:

Validation:

Configuration Control:

Notes:

Public Health

NASA HQ POC: John Haynes

NASA HQ POC Phone: (202) 358-4665

NASA HQ POC e-mail: jhaynes@mail.hq.nasa.gov



# RSVP

## Rapid Syndrome Validation Project

**Purpose/General Description of Decision Support Tool:** Collect and distribute data to and from doctors and provide current public health information pertaining to the progression of infectious disease outbreaks.

**Value and Benefits:** Provide early warnings for harmful exposures, conditions favorable to vector proliferation; Reduce environmental related diseases; Improve prevention initiative targeting.

### Predictions and

#### Observations:

- Soil moisture
- Atmosphere temperature
- Ground temperature
- Humidity
- Precipitation
- Total column Ozone
- Total aerosol amount



### Outcomes:

- Improve knowledge of vector ecology
- Improve NCEP-ETA model with DREAM inputs
- Improve DREAM inputs with NASA products
- Improve aerosol and smoke dispersion models with NASA products

# DRAFT

DST Point of Contact (POC): Greg Mann

POC e-mail: gremann@sandia.gov

POC Phone: (505) 845-7928

Decision Support Tool User/Operator Organization: Sandia National Laboratory

Decision Support Tool Owner/Developer: Sandia National Laboratory

Operational Status:

DST Type: Web-enabled application

Validation:

Configuration Control:

Notes:

NASA HQ POC: John Haynes

NASA HQ POC Phone: (202) 358-4665

NASA HQ POC e-mail: jhaynes@mail.hq.nasa.gov

Public Health



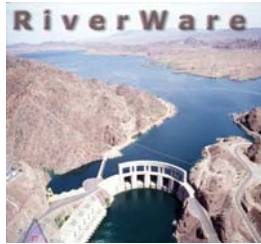
**Purpose/General Description of Decision Support Tool:** Simulate and optimize the management of multipurpose reservoir systems.

**Value and Benefits:** Improvement ability to identify: impaired surface waters, storm water; management issues, drinking water source protection; Improve habitat management practices; Improve efficiency of water use; Increase agricultural productivity.

## **Predictions and**

### **Observations**

- Soil moisture
- Evapotranspiration
- Precipitation
- Snow cover, accumulation, and water equivalent
- Groundwater storage change
- Vegetation type
- River discharge height
- Flood and drought assessment and prediction
- Seasonal forecast



## **Outcomes:**

- Estimate river flow and water loss to vegetation
- Assess river sustainability

# DRAFT

**DST Point of Contact (POC):** Terry Fulp

**POC e-mail:** dmatthews@do.usbr.gov

**POC Phone:** (303) 445-2470

**Decision Support Tool User/Operator Organization:** University of Colorado, Center for Advance Decision Support for Water and Environmental Studies

**Decision Support Tool Owner/Developer:**

**Operational Status:** 2000

**DST Type:** Software, downloadable software to be installed locally

**Validation:**

**Configuration Control:**

**Notes:**

**Water Management**

**NASA HQ POC:** Jared Entin

**NASA HQ POC Phone:** (202) 358-0275

**NASA HQ POC e-mail:** jentin@mail.hq.nasa.gov



# AWARDS

## Agricultural Water Resources And Decision Support

**Purpose/General Description of Decision Support Tool:** Improve efficiency of water management and irrigation scheduling by providing guidance on when and where to deliver water and how much to apply.

**Value and Benefits:** Improvement ability to identify: impaired surface waters, storm water; management issues, drinking water source protection; Improve habitat management practices; Improve efficiency of water use; Increase agricultural productivity.

### Predictions and Observations

- Soil moisture
- Evapotranspiration
- Precipitation
- Snow cover, accumulation, and water equivalent
- Groundwater storage change
- Vegetation type
- River discharge height
- Flood and drought assessment and prediction
- Seasonal forecasts



### Outcomes:

- Estimate water consumption by crops
- Assess Crop suitability
- Determine Irrigation requirements

# DRAFT

DST Point of Contact (POC): Curt Hartzell

POC e-mail: [chartzell@do.usbr.gov](mailto:chartzell@do.usbr.gov)

POC Phone: (303) 445-2482

Decision Support Tool User/Operator Organization: US Bureau of Reclamation

Decision Support Tool Owner/Developer:

Operational Status: 2000

DST Type: Clearinghouse or compendium of thematically related pieces

Validation:

Configuration Control:

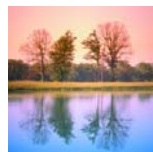
Notes:

Water Management

NASA HQ POC: Jared Entin

NASA HQ POC Phone: (202) 358-0275

NASA HQ POC e-mail: [jentin@mail.hq.nasa.gov](mailto:jentin@mail.hq.nasa.gov)



# AHPS

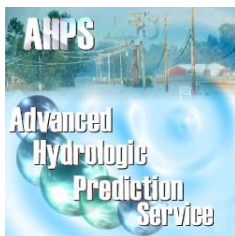
## Advanced Hydrologic Prediction Service

**Purpose/General Description of Decision Support Tool:** Improve flood warnings and water resource forecasts. Provide enhanced hydrologic services, in support of protecting life, property, and economic well being.

**Value and Benefits:** Improvement ability to identify: impaired surface waters, storm water; management issues, drinking water source protection; Improve habitat management practices; Improve efficiency of water use; Increase agricultural productivity.

### Predictions and Observations

- Soil moisture
- Evapotranspiration
- Precipitation
- Snow cover, accumulation, and water equivalent
- Groundwater storage change
- Vegetation type
- River discharge height
- Flood and drought assessment and prediction
- Seasonal forecasts



### Outcomes:

# DRAFT

DST Point of Contact (POC):

POC e-mail: [AHPS@noaa.gov](mailto:AHPS@noaa.gov)

POC Phone:

Decision Support Tool User/Operator Organization: NOAA Northwest River Forecast Center

Decision Support Tool Owner/Developer:

Operational Status:

DST Type: Web-enabled application

Validation:

Configuration Control:

Notes:

Water Management

NASA HQ POC: Jared Entin

NASA HQ POC Phone: (202) 358-0275

NASA HQ POC e-mail: [jentin@mail.hq.nasa.gov](mailto:jentin@mail.hq.nasa.gov)



# BASINS

## Better Assessment Science Integrating Point and Nonpoint Sources

**Purpose/General Description of Decision Support Tool:** Perform watershed and water quality based studies at selected stream sites or throughout an entire watershed.

**Value and Benefits:** Improvement ability to identify: impaired surface waters, storm water; management issues, drinking water source protection; Improve habitat management practices; Improve efficiency of water use; Increase agricultural productivity.

### Predictions and

#### Observations

- Soil moisture
- Evapotranspiration
- Precipitation
- Snow cover, accumulation, and water equivalent
- Groundwater storage change
- Vegetation type
- River discharge height
- Flood and drought assessment and prediction
- Seasonal forecasts



### Outcomes:

- Facilitate examination of environmental information
- Provide an integrated watershed and modeling framework
- Support analysis of point and nonpoint source management alternatives
- Evaluate urban/rural land use

# DRAFT

DST Point of Contact (POC): Dr. Russell Kinerson

POC e-mail: [basins@epa.gov](mailto:basins@epa.gov)

POC Phone: (202) 566-0409

Decision Support Tool User/Operator Organization: Environmental Protection Agency

Decision Support Tool Owner/Developer:

Operational Status: Available since 1996

DST Type: Software, downloadable software to be installed locally

Validation:

Configuration Control:

Notes:

Water Management

NASA HQ POC: Jared Entin

NASA HQ POC Phone: (202) 358-0275

NASA HQ POC e-mail: [jentin@mail.hq.nasa.gov](mailto:jentin@mail.hq.nasa.gov)



## LINK ArcGIS Tools for Conservation Planning

**Purpose/General Description of Decision Support Tool:** Provide public and private land managers and similar authorities a capability to incorporate landscape, species, and habitat relations into their land management and conservation planning processes. The ability to assess rapidly landscape attributes and to link these with species-habitat information to provide forecasts and assessments as needed for use planning

### Value and Benefits:

Predictions and  
Observations



Outcomes:  
Future habitat prediction  
plots for proposed land  
usage options

# DRAFT

DST Point of Contact (POC): Timothy J. Fox

POC e-mail:

POC Phone: (608) 783-6451

Decision Support Tool User/Operator Organization:

Decision Support Tool Owner/Developer:

Operational Status:

DST Type:

Validation:

Configuration Control:

Notes:

NASA HQ POC:

NASA HQ POC Phone:

NASA HQ POC e-mail:

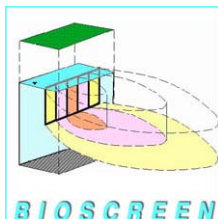
# BIOSCREEN

## Natural Attenuation Decision Support Tool

**Purpose/General Description of Decision Support Tool:** Simulate remediation of dissolved hydrocarbons at petroleum release sites through natural attenuation based on Domenico analytic transport model. Three types are addressed: Solute transport (1) without decay, (2) with biodegradation as a first order, and (3) with biodegradation as an instantaneous biodegradation reaction.

### Value and Benefits:

#### Predictions and Observations



#### Outcomes:

Modeled depiction of subterranean contaminant plumes of hydrocarbons and biodegradation at petroleum handling sites

# DRAFT

DST Point of Contact (POC): Rob Earle

POC e-mail: earle.rob@epa.gov or csmos.ada@epa.gov

POC Phone: 580-436-8531

Decision Support Tool User/Operator Organization:

Decision Support Tool Owner/Developer:

Operational Status:

DST Type:

Validation:

Configuration Control:

Notes:

NASA HQ POC:

NASA HQ POC Phone:

NASA HQ POC e-mail:

# CAMEO

## Computer-Aided Management of Emergency Operations

**Purpose/General Description of Decision Support Tool:** System of software applications used widely to plan and respond to chemical emergencies. CAMEO also support regulatory compliance by helping users to meet chemical reporting requirements of Emergency Planning & Community Right to Know Act (EPCRA). CAMEO integrates a chemical database and a method to manage the data, an air dispersion model, and a mapping capability.

### Value and Benefits:

#### Predictions and Observations



#### Outcomes:

Linked chemical-specific information on management, storage, hazardous issues, fire-fighting techniques, cleanup procedures, protective clothing, etc, for 6,000 chemicals with 80,000 synonyms or product names including storage facilities and contents and emergency planning resources

# DRAFT

DST Point of Contact (POC): (1)NOAA/NOS/ORR (Office of Response and Restoration)

POC e-mail: [ceppo@epamail.epa.gov](mailto:ceppo@epamail.epa.gov)

POC Phone: (800) 424-9346

Decision Support Tool User/Operator Organization:

Decision Support Tool Owner/Developer:

Operational Status:

DST Type:

Validation:

Configuration Control:

Notes:

NASA HQ POC:

NASA HQ POC Phone:

NASA HQ POC e-mail:

# CAPS

## Center for Analysis and Prediction of Storms

**Purpose/General Description of Decision Support Tool:** Develop and demonstrate techniques for the numerical analysis and prediction of high-impact local weather and environmental conditions including comprehensive regional to storm scale model that provides an analytic storm prediction and analysis capability that is combines with Doppler radar, direct observations and other background fields to provide severe storm predictions and analysis.

### Value and Benefits:

#### Predictions and Observations



#### Outcomes:

Comprehensive high impact numerical storm scale weather predictions  
-84 hour Continental US  
Domain Synoptic Forecast  
27 km Grid Initialized at 00 UTC  
-24 hour Southern Plains  
Mesoscale Forecast  
9 km Grid Spacing Initialized at 12 UT  
-Multiple Southern Plains Storm  
Forecasts at 3 km  
Grid Spacing Initialized at 12  
UTC (12 Hr Forecast) and 00  
UTC (6 hour forecast)

# DRAFT

DST Point of Contact (POC): Dr Wu Wang

POC e-mail: [arps.support@ou.edu](mailto:arps.support@ou.edu)

POC Phone: (405) 325-6037

Decision Support Tool User/Operator Organization:

Decision Support Tool Owner/Developer:

Operational Status:

DST Type:

Validation:

Configuration Control:

Notes:

NASA HQ POC:

NASA HQ POC Phone:

NASA HQ POC e-mail:

# SFLMST

## South Florida Land Management Support Tool

**Purpose/General Description of Decision Support Tool:** Ecosystem portfolio model (EPM) to evaluate land use decisions to maintain a balance between ecological health of South Florida Parks

### Value and Benefits:

#### Predictions and Observations



**Outcomes:**  
User needs definition;  
Community wealth estimates. Regional ecological impacts; Land values;  
Socioeconomic indices;  
Ecological & environmental impact definitions;  
Economic externalities with specific land acquisition strategies.

# DRAFT

DST Point of Contact (POC): Paul Hearn

POC e-mail: [phearn@usgs.gov](mailto:phearn@usgs.gov)

POC Phone: 703-648-6287

Decision Support Tool User/Operator Organization:

Decision Support Tool Owner/Developer:

Operational Status:

DST Type:

Validation:

Configuration Control:

Notes:

NASA HQ POC:

NASA HQ POC Phone:

NASA HQ POC e-mail:

# FEPS

## Fire Emission Production Simulator

**Purpose/General Description of Decision Support Tool:** Help Fire Managers estimate and mitigate the rates of heat, particles, and carbon gas emissions from controlled burns of harvest-slash residue in Northwest US forests.

**Value and Benefits:**

**Predictions and  
Observations**



**Outcomes:**

Hourly estimates of emissions and heat release information for prescribed burns and wildland fires.

# DRAFT

DST Point of Contact (POC): Ellen Eberhardt  
POC e-mail: eberhardt@fs.fed.us  
POC Phone: (541) 750-7481

Decision Support Tool User/Operator Organization:  
Decision Support Tool Owner/Developer:  
Operational Status:  
DST Type:  
Validation:  
Configuration Control:  
Notes:

NASA HQ POC:  
NASA HQ POC Phone:  
NASA HQ POC e-mail:

# Sustainable Water Supply DSS

**Purpose/General Description of Decision Support Tool:** Provide an integrated framework for fresh water assessment that seeks sustainable water solutions by balancing the needs for basic water services, development and the environment.

## Value and Benefits:

Predictions and  
Observations



**Outcomes:**  
Fresh water sustainability  
assessments at the global,  
regional, national and  
watershed levels

# DRAFT

DST Point of Contact (POC): Jack Sieber or David Purkey

POC e-mail: [jack.sieber@sei-us.org](mailto:jack.sieber@sei-us.org)

[dpurkey@sei-us.org](mailto:dpurkey@sei-us.org)

POC Phone: (617) 449-9603

Decision Support Tool User/Operator Organization:

Decision Support Tool Owner/Developer:

Operational Status:

DST Type:

Validation:

Configuration Control:

Notes:

NASA HQ POC:

NASA HQ POC Phone:

NASA HQ POC e-mail:

# PORTS

## Physical Oceanographic Real-Time System

**Purpose/General Description of Decision Support Tool:** Promote navigation safety and improve the efficiency ports and other restricted US waterways, specifically in the fourteen locations where PORTS is currently installed

### Value and Benefits:

#### Predictions and Observations



#### Outcomes:

(As required locally) water levels, present status and forecast weather and water information in real time to mariners approaching and operating in any of fourteen harbor entrances or other congested US waterways to allow mariners to maintain an adequate margin of clearance for safety of movement and to allow port operators to maximize port or other critical waterway throughput.

**DRAFT**

DST Point of Contact (POC): Michael Scobados (pronounced “Zabados”)

POC e-mail:

POC Phone:

Decision Support Tool User/Operator Organization:

Decision Support Tool Owner/Developer:

Operational Status:

DST Type:

Validation:

Configuration Control:

Notes:

NASA HQ POC:

NASA HQ POC Phone:

NASA HQ POC e-mail:

**Purpose/General Description of Decision Support Tool:** Provide a public Federal Internet-based site for distribution of data from US National Integrated Survey System and BLM Legacy Rehost 2000 System of land descriptions and parcel information including standard legal land descriptions of prepackage areas such and counties, National Forests, and BLM parcels

## Value and Benefits:

### Predictions and Observations



### Outcomes:

- Map service to view or stream live data directly to a user's desk top using GIS software or into their web browser.
- Internet-based means to search, view, and download survey-based data as GIS Shapefiles
- Download Public Land Survey System (PLSS) and other prepackaged survey data in single shape files containing one or more townships

**DRAFT**

DST Point of Contact (POC): Leslie Cone  
POC e-mail: [Leslie\\_Cone@blm.gov](mailto:Leslie_Cone@blm.gov)  
POC Phone: (303) 236-0815

Decision Support Tool User/Operator Organization:  
Decision Support Tool Owner/Developer:  
Operational Status:  
DST Type:  
Validation:  
Configuration Control:  
Notes:

NASA HQ POC:  
NASA HQ POC Phone:  
NASA HQ POC e-mail:

# **Applied Sciences Program**

## **Policy Partner Decision Support Tools**

# MiniCAM

## Mini Climate Assessment Model

### Purpose/General Description of Decision Support Tool:

**Value and Benefits:** Optimize renewable energy systems for power production; Integrate traditional and renewable energy supply systems into electric power grid; Improve prediction of electric power need and supply—mitigate power shortages, prevent price increase; Reduce greenhouse emissions from energy production.

#### Predictions

- 20+ years
- Past 90 days
- 1–15-day forecasts
- 12–18-month seasonal forecasts
- 10–20-year forecasts

#### Observations

- Temperature and humidity profiles
- Cloud systems
- Land cover albedo
- Land surface temperature
- Soil moisture
- Ocean surface winds
- Global Precipitation
- Total aerosol amount
- Land surface topography
- Trace gas profiles



**Outcomes:**

**DRAFT**

DST Point of Contact (POC):

POC e-mail:

POC Phone:

Decision Support Tool User/Operator Organization:

Decision Support Tool Owner/Developer:

Operational Status:

DST Type:

Validation:

Configuration Control:

Notes:

NASA HQ POC:

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Energy Management / Climate



# PGCAM

## Process Global Climate Assessment Model

### Purpose/General Description of Decision Support Tool:

**Value and Benefits:** Optimize renewable energy systems for power production; Integrate traditional and renewable energy supply systems into electric power grid; Improve prediction of electric power need and supply—mitigate power shortages, prevent price increase; Reduce greenhouse emissions from energy production.

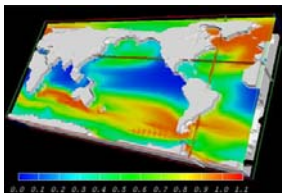
#### Predictions

- 20+ years
- Past 90 days
- 1–15-day forecasts
- 12–18-month seasonal forecasts
- 10–20-year forecasts

#### Observations

- Temperature and humidity profiles
- Cloud systems
- Land cover albedo
- Land surface temperature
- Soil moisture
- Ocean surface winds
- Global Precipitation
- Total aerosol amount
- Land surface topography
- Trace gas profiles

#### Outcomes:



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# CMAQ

## Community Multiscale Air Quality Modeling System

### Purpose/General Description of Decision Support Tool:

**Value and Benefits:** Reduce lung-related diseases and premature death; Reduce hospital admissions and use of medicines; Reduce lost workdays and schooldays; Improve visibility and reduce haze for Tourism; Improve resiliency of crops, increase yields; Increase confidence in Government; Improve crop estimates; Sensitive populations can change activities.

#### Predictions and Observations:

- Atmospheric state parameters
- Global-to-regional concentrations
- Emissions inventories
- Regional-global transport
- Trace gas sources
- Aerosol properties
- Ozone profiles and columns
- Global-regional boundary conditions
- Data fusion techniques
- Ground-satellite data comparison techniques



#### Outcomes:

- Assess emissions-control strategies
- Develop achievable SIPs (State Implementation Plan)
- Assess compliance
- Waivers to air standards
- Quantify voluntary stationary emission reductions

# DRAFT

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Air Quality



# NEMS

## National Energy Modeling System

### Purpose/General Description of Decision Support Tool:

**Value and Benefits:** Optimize renewable energy systems for power production; Integrate traditional and renewable energy supply systems into electric power grid; Improve prediction of electric power need and supply—mitigate power shortages, prevent price increase; Reduce greenhouse emissions from energy production.

#### Predictions

- 20+ years
- Past 90 days
- 1–15-day forecasts
- 12–18-month seasonal forecasts
- 10–20-year forecasts

#### Outcomes:

#### Observations

- Temperature and humidity profiles
- Cloud systems
- Land cover albedo
- Land surface temperature
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# DRAFT

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Energy Management



# Water Quantity

## Purpose/General Description of Decision Support Tool:

**Value and Benefits:** Improvement ability to identify: impaired surface waters, storm water; management issues, drinking water source protection; Improve habitat management practices; Improve efficiency of water use; Increase agricultural productivity.

### Predictions and Observations

Predictions and

Observations

- Soil moisture
- Evapotranspiration
- Precipitation
- Snow cover, accumulation, and water equivalent
- Groundwater storage change
- Vegetation type
- River discharge height
- Flood and drought assessment and prediction
- Seasonal forecasts

### Outcomes:



DRAFT

DST Point of Contact (POC):

POC e-mail:

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Decision Support Tool User/Operator Organization:

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Operational Status:

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Water Management



# Sea Level Rise/Coastal Inundation

## Purpose/General Description of Decision Support Tool::

**Value and Benefits:** Reduce public health risks, hospital admissions, lost work-school days; Reduce impacts to regional coastal economies & tourism; Raise quotas for shellfish harvesting prior to HABs; improve siting and design of shellfish beds; Preserve ecological diversity and tourism economies; Reduce threats to human and natural environments; Rapid response to emergencies to reduce effects on human safety and economies; Public health and reduce preventable costs.

### Predictions and Observations:

- Nearshore upwelling
- Speed and direction of ocean currents
- Ecological forecasts
- Runoff change
- Seasonal forecasts
- Aerosol properties
- Salinity predictions
- Ocean surface currents/winds/topography
- Sea Surface salinity/temperature
- Land use
- Phytoplankton concentrations

### Outcomes:



**DRAFT**

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Coastal Management











*Science Mission Directorate  
Earth-Sun System Division*



This booklet is part of a series of three booklets. Please read the Satellite Models booklet for more information on the individual models and the Missions booklet for more information on the individual missions.

These booklets are derived from the **Earth-Sun Science System Knowledge Base** which is available on-line at  
<http://www.asd.ssc.nasa.gov/m2m>

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<http://science.hq.nasa.gov>